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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/715,456	11/19/2003	Takashi Okuda	009683-486	3920

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EXAMINER	
NGUYEN, KHAI M	

ART UNIT	PAPER NUMBER
2819	

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/715,456	OKUDA ET AL.	
	Examiner	Art Unit	
	Khai M. Nguyen	2819	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 November 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6 and 8-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *9 and 12* is/are allowed.

6)☒ Claim(s) *1-3,5,6,8,10 and 11* is/are rejected.

7)☒ Claim(s) *4* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 6 is objected because it is unclear which digital signal the applicants refer it to (see line 2). Clarification/correction is required

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Karema et al. (US 5,061,928) (**Karema**).

Regarding claim 1, Karema discloses a sigma-delta modulator apparatus (Fig. 1), comprising: component separating unit (block A) separating a signal component (D1) and an error component (the quantization error signal -Q1) of an input signal (x) (wherein **the signal 'x' is an analog input or a digital input** – see: column 4, line 32 and column 5, lines 47-65) from each other; a delta-sigma modulator (block B) modulating the signal error component (-Q1) separated by the component separating unit (see the abstract and column 4, lines 47-51); and an output operating unit (comprising blocks 13-16, and 21) operating the signal component separated by the component separating unit and the error component modulated by the sigma-delta modulator.

Regarding claim 2, Karema discloses the component separating unit of claim 1 including: a first quantizer/comparator (6) for quantizing, at least in part, the digital input signal; and an adder (1) for adding the digital input signal (x) to the signal component provided from the first quantizer/comparator (6) via the feedback loop.

Regarding claim 3, Karema et al. discloses the delta-modulator (block B) of claim 2 including: a plurality of integrating/filter means (1, 4 – column 3, lines 43-45); a second quantizer/comparator (6) for quantizing an output of the integrator of the final stage (4); and a delay element (8,9) for delaying an output of the second quantizer to perform negative feedback by sending the delayed output to plurality of integrators (Fig. 1).

Regarding claim 5, Karema's apparatus which includes an attenuator means (12, Fig. 1) having a coefficient (or scaling factor) smaller than one (col. 4, lines 45-46).

Claim 11 is rejected under 35 U.S.C. 102(b) as being anticipated by Walden et al. (US 5,153,593) (Walden). Walden discloses an apparatus (see Fig. 1), including:

a component separating unit (14) for separating/producing a signal component (to the block/element 31) and an error component (to the element 52) of an input signal form each other;

a delta-sigma modulator (block 18 – see the middle portion of the abstract) for modulating the error component (quantization error) separated by the component separating unit (14); and

an output operating unit (comprising the right side of Fig. 1 – elements 31, 32, 38, and 40) operating the signal component (the output signal of the block 14)

separated by the component separating unit and the error component modulated by the delta-sigma modulator (18), wherein the component separating unit (14) includes a M-bit quantizer (24 – col. 3, lines 49+) quantizing an analog input signal (33), a first digital-to-analog converter (DAC) (28) for converting the signal component provided from the quantizer (24) to an analog signal (46), an adder/summer/combiner (44) for adding/summer/combining the analog input signal (33) to the analog signal provided from the DAC (28).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walden et al. (US 5,153,593) in view of Karema et al. (US 5,061,928).

Regarding claim 8, Walden discloses an apparatus (see Fig. 1), including:

a component separating unit (14) for separating/producing a signal component (to the block/element 31) and an error component (to the element 52) of an input signal form each other;

a delta-sigma modulator (block 18 – see the middle portion of the abstract) for modulating the error component (quantization error) separated by the component separating unit (14); and

an output operating unit (comprising the right side of Fig. 1 – elements 31, 32, 38, and 40) operating the signal component (the output signal of the block 14) separated by the component separating unit and the error component modulated by the delta-sigma modulator (18), wherein the component separating unit (14) includes a first quantizer (24 – col. 3, lines 49+) quantizing an analog input signal (33), a first digital-to-analog converter (DAC) (28) for converting the signal component provided from the quantizer (24) to an analog signal (46), an adder/summer/combiner (44) for adding/summer/combining the analog input signal (33) to the analog signal provided from the DAC (28).

Walden also discloses the delta-sigma modulator (18) comprising: an integration block (22), a second quantizer (26 – col. 3, lines 49+) for quantizing an output of the integration block in the final stage, and a second DAC (30) for converting an output of the second quantizer to an analog signal (54). Walden only lacks to show the integration block (22) having a plurality of integrator stages and a delay element associated with the second DAC and the feedback signal.

Karema discloses a cascading two or more sigma-delta modulators, wherein the second sigma-delta modulator (block B), which receives an error component, comprising a plurality of integrators/filters (2,4) and delay elements (8, 9) associated with the modulator and a digital-to-analog converter means (6 and 10) for providing negative feedback to the integrators (2 and 4) (see Fig. 1 and the summary of the invention, lines 40+). Therefore, it would have been obvious to one person having ordinary skills in the art to provide a modulator as taught by Walden with the plurality of

integrators and delay element(s) as suggested/taught by Karema for the purpose of improving signal-to-quantization noise ration (see lines 19+ of the summary).

Regarding claim 10, Walden discloses the modulator of claim 8 including an attenuator (34) electrically connected between the adder/summer (44) and the delta-sigma modulator (18).

Allowable Subject Matter

6. Claims 9 and 12 are allowed.

7. Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The allowability of claims 2-3, 5, and 9 is withdrawn for the reason above (see the rejection).

Response to Arguments

9. Applicant's arguments filed 11/04/2004 have been fully considered but they are not persuasive because the input signal "x" is a digital signal (or an analog signal) (see the passage as point out in the above rejection) and the signal provided to the modulator (B of Fig. 1) is the quantization error component signal generated/produced by the component separating unit or preceding modulator (A). For the reasons above, the rejection is maintained.

Contact Information

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khai M. Nguyen whose telephone number is 571-272-1809. The examiner can normally be reached on 8:00 to 4:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael J Tokar can be reached on 571-272-1812. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KN
December 2, 2004

Michael Tokar
Supervisory Patent Examiner
Technology Center 2800